



3 February 2020

ASX ANNOUNCEMENT

## EXPLORATION – NEW GOLD MINERALISATION SYSTEM MODEL

### Highlights

CSA Global consultants from Australia has undertaken a preliminary ore genesis model and structural geology interpretation of the Eastern Transvaal (Sabie/Pilgrim's) Gold Fields. The main findings include:

- The Bushveld Complex (largest layered mafic igneous intrusive complex on Earth<sup>1</sup>) is interpreted as the key driver and source of the gold mineralisation at the Eastern Transvaal Gold Fields.
- Intrusion and emplacement of the Bushveld Complex induced E-W compression in the Sabie & Pilgrim's Rest area.
- The E-W compression corresponded with local N-S extension that formed E-W joint sets, which formed a structural pathway for the transport of gold-bearing fluids away from the Bushveld Complex.
- The dolomitic Malmani Subgroup (a sedimentary unit within the Eastern Transvaal Basin) formed a reducing chemical trap that caused deposition of gold from the mineralising fluids (Theta Reef), while the NE-trending structures and dykes formed a structural or physical trap, also associated with the formation of gold deposits (Rietfontein).
- Based on the above Mineral Systems Model, targeted areas within the tenement package have been prioritised to refine exploration efforts.

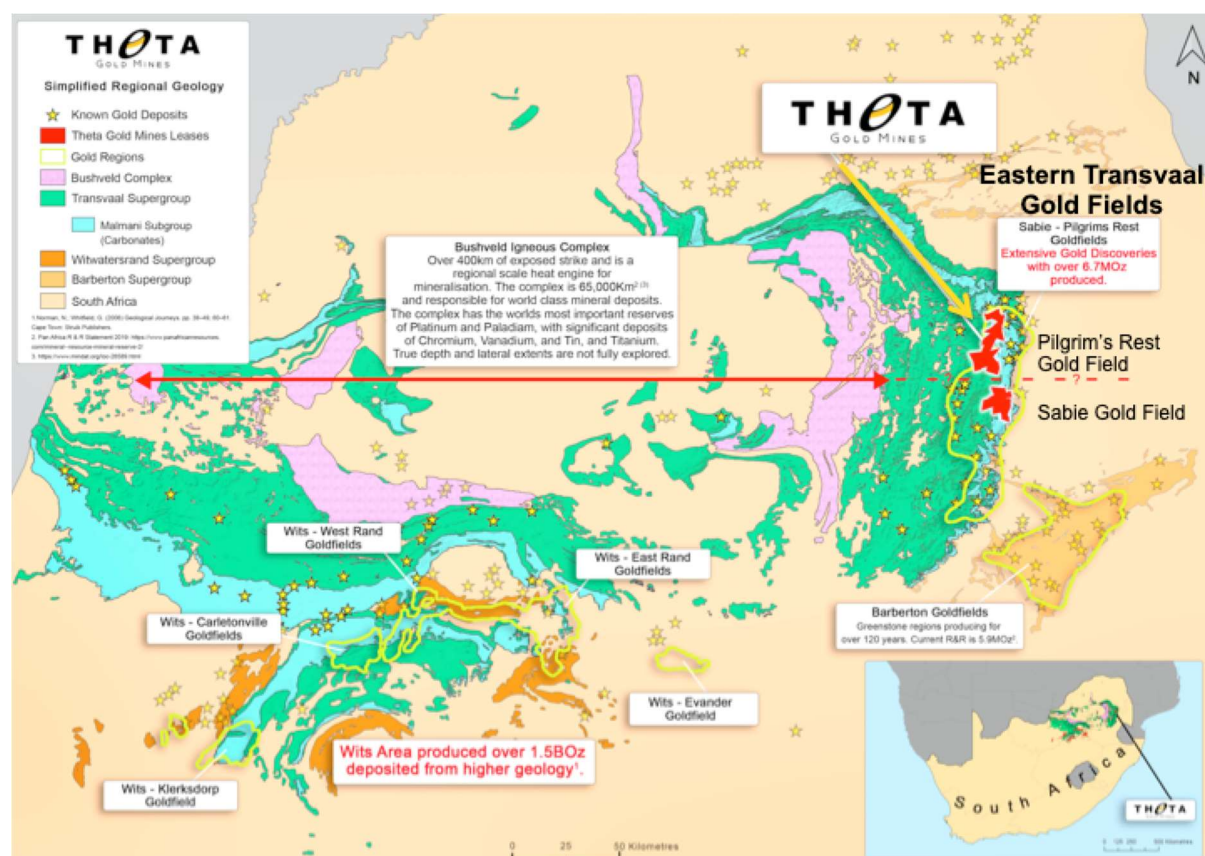
Following the recommendations from CSA Global:

- Core samples from site have been sent for petrophysical analysis by Southern Geoscience Consultants in Perth.
- Regional magnetic and ASTER satellite data will be reprocessed.
  - Magnetic geophysical data has the potential to identify structural fluid pathways and structural traps for exploration targeting.
  - ASTER imagery can identify minerals related to alteration; this will assist in targeting structural pathways for fluid transport.
- Based on the work to date, a regional evaluation for potential exploration targets will be completed.

South Africa focused Theta Gold Mines Limited ("Theta Gold" or "Company") (ASX: TGM, TGMO | OTCQB: TGMGF) is pleased to provide an update on the Eastern Transvaal Gold Fields. CSA Global (an ERM group company) has developed a Mineral System Model (ore

genesis and structural geology model) to support the Company's exploration efforts. The new models interpret the role of the intrusive Bushveld Complex as the main source of gold-bearing fluids for the Eastern Transvaal Gold Fields (Figure 1). These models have been used to refine areas for exploration both within the existing 620 km<sup>2</sup> tenement package and on a regional scale.

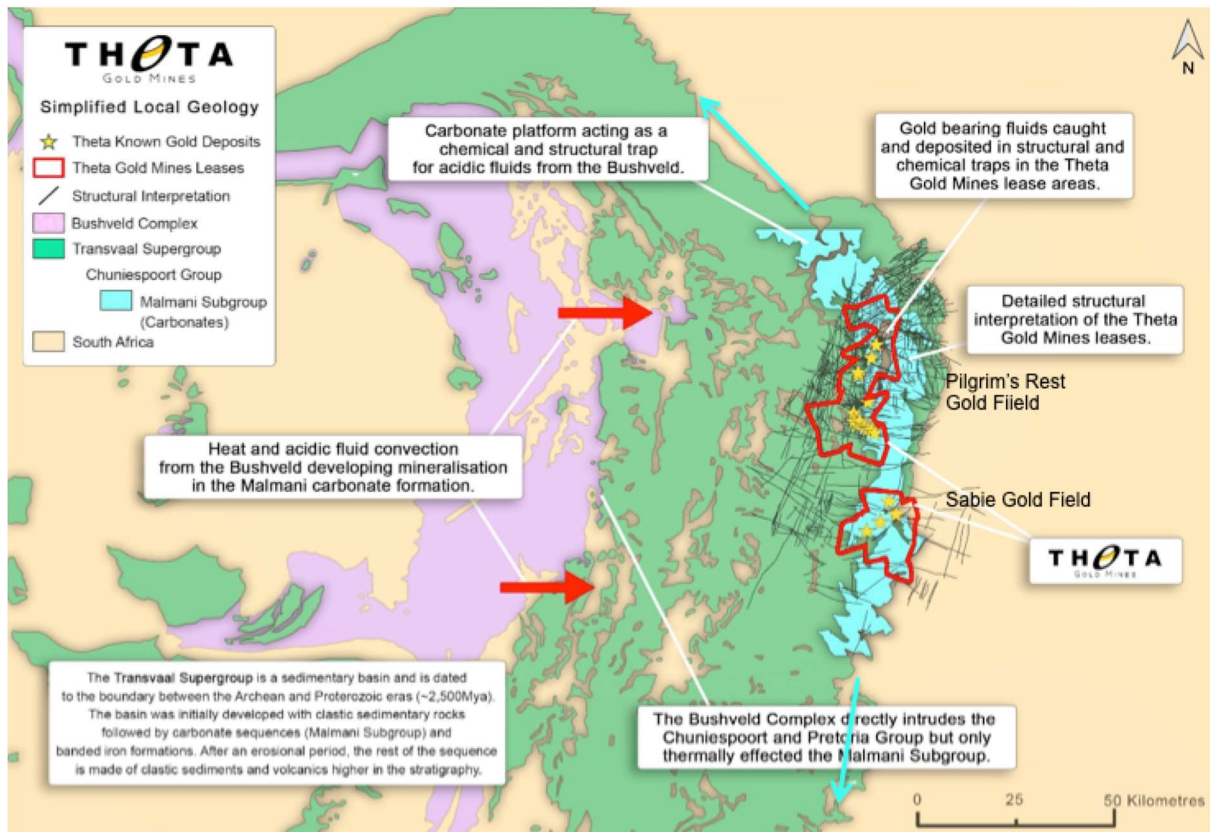
The CSA Global Mineral System model interpreted that east-west structures (faults and joints) provided fluid pathways for mineralising fluids from the Bushveld Complex to the Eastern Transvaal Gold Fields (Figure 2). Based on these new interpretations, Theta Gold is now assessing the regional exploration potential of the wider Eastern Transvaal Basin.



**Figure 1: Regional geology and Theta Gold Mining Rights**

## Notes

- <sup>1</sup> <https://www.wits.ac.za/science/archive/geosciences/course-information/aaigfs/the-bushveld-complex/>



**Figure 2: Interpreted structural map and gold mineralisation diagram**

**Theta Gold Chairman Bill Guy commented:** *"The Company has made strong progress in its understanding of geodynamic controls of the gold mineralisation processes at play in the Eastern Transvaal Gold Fields. The new understanding will promote the next exciting generation of local and regional gold exploration and target generation."*

*ASTER satellite data and regional magnetics will be reprocessed to form base maps for future exploration. Exploration is always exciting to define new resource targets locally and regionally. The exploration strategy will be carried out on three fronts; exploration to be regionally dominant player; resource development work to increase mine life; and development of the starter-pits Theta open-cut Project to become a highly profitable & sustainable gold producer."*

This announcement was authorised for release by the Board of Directors.

For more information please visit [www.thetagoldmines.com](http://www.thetagoldmines.com) or contact:

**General Enquiries**

**Rob Thomson, Managing Director**

**Theta Gold Mines Limited**

M: +61 409 843 963

[robt@thetagoldmines.com](mailto:robt@thetagoldmines.com)

or

**Investor Enquiries**

**Bill Guy, Chairman**

**Theta Gold Mines Limited**

T: + 61 2 8912 2126

[billg@thetagoldmines.com](mailto:billg@thetagoldmines.com)

**United States** - Michael Porter, Porter, LeVay & Rose Inc: +1 212 564 4700,

[theta@plrinvest.com](mailto:theta@plrinvest.com)

## **Appendix A**

### **CSA Global Exploration – Mineral System Modelling Summary**

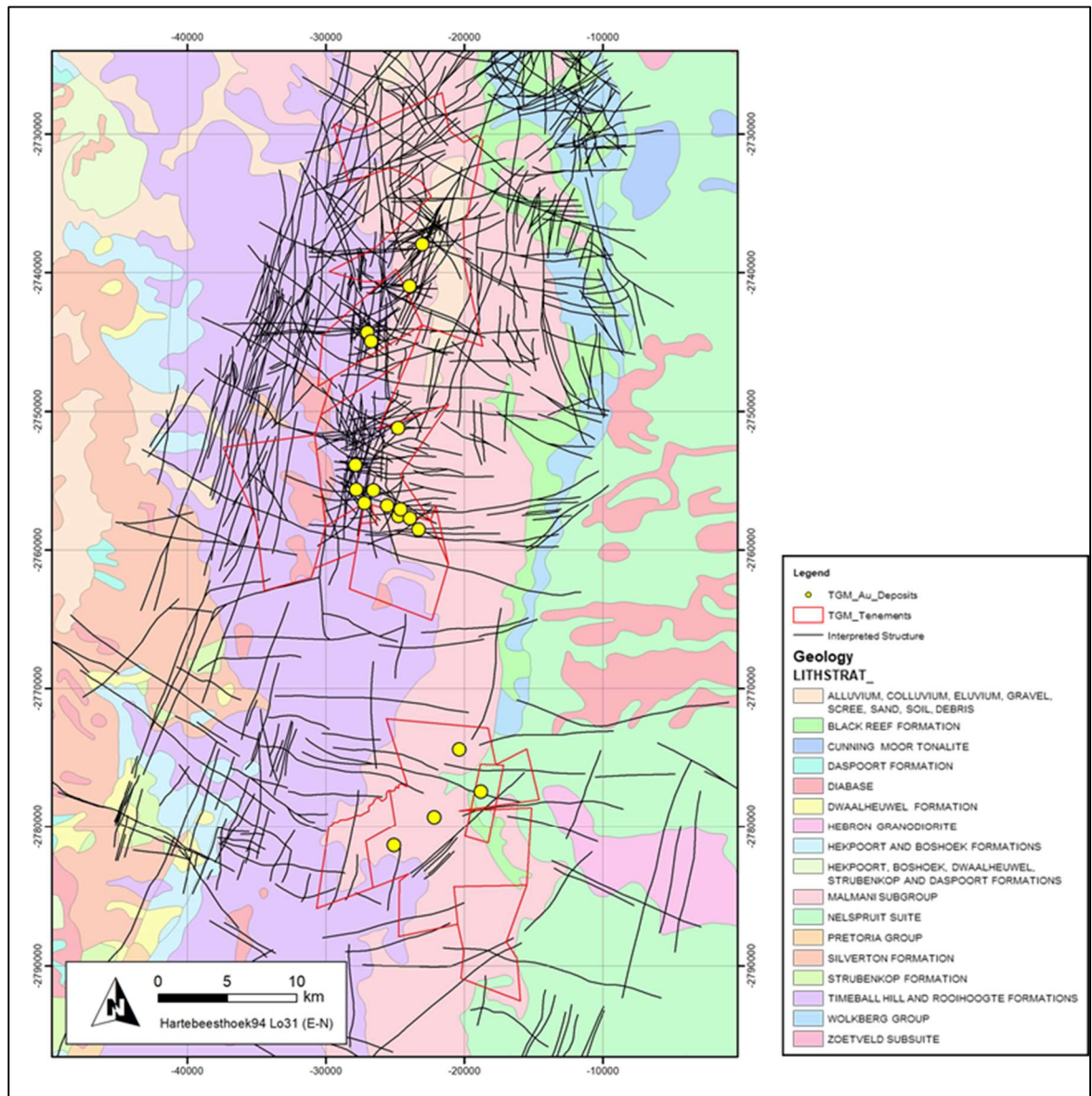
Theta Gold Mines Limited (TGM) requested that CSA Global compile and review existing geological datasets with a view to develop a preliminary structural geology and mineral systems model (Figure 3). A Leapfrog and GIS model compiled data provided by TGM including surface geochemistry and drilling results, resource block models, and surveys from historical mine workings. Additional datasets were downloaded from public domain sources, including STRM topographic data, Landsat imagery, geological maps, regional geophysical data, and published literature.

#### **Structural Interpretation**

Structures primarily occur in two different orientations:

- NNE-SSW trending structures are distinct discontinuities in the landscape and correlate with linear magnetic highs in the same orientation, which represent a dyke swarm.
- Approximately E-W trending structures have been previously observed as joint sets in outcrop by Metz (2015). On a regional-scale the E-W structures form subtle discontinuities in surface geology and form linear trends identified in landscape geomorphology. Structures on this orientation correlate with the orientation of deep-seated structures in the underlying granite-greenstone basement terrane of the Kaapvaal Craton.





**Figure 3: Preliminary local structural geological map of the TGME Tenements**

### The Source of Mineralising Fluids

Emplacement of the Bushveld Complex at 2055 Ma has been attributed as the cause of contemporaneous regional-scale mineralising events by driving large-scale hydrothermal circulation.

Tyler (1986) interpreted a magmatic origin for Au-bearing mineralising fluids, supported by a high homogenisation temperature gradient indicated by fluid inclusions, together with oxygen isotope compositions characteristic of mixing between fluid of a magmatic source and saline formation water.

Boer (1995) found that the mineralising fluids were similar to those of mesothermal gold deposits, but that they differ in that they are ubiquitous with Cu and Bi, have high salinities and low-CO<sub>2</sub>. Such characteristics are more typical of magmatically-derived fluids.

Metz (2015) found that oxygen, carbon and sulphur isotopes from various ore and gangue minerals support a magmatic origin for the fluids, which interacted with fluids from both crustal and meteoric origins.

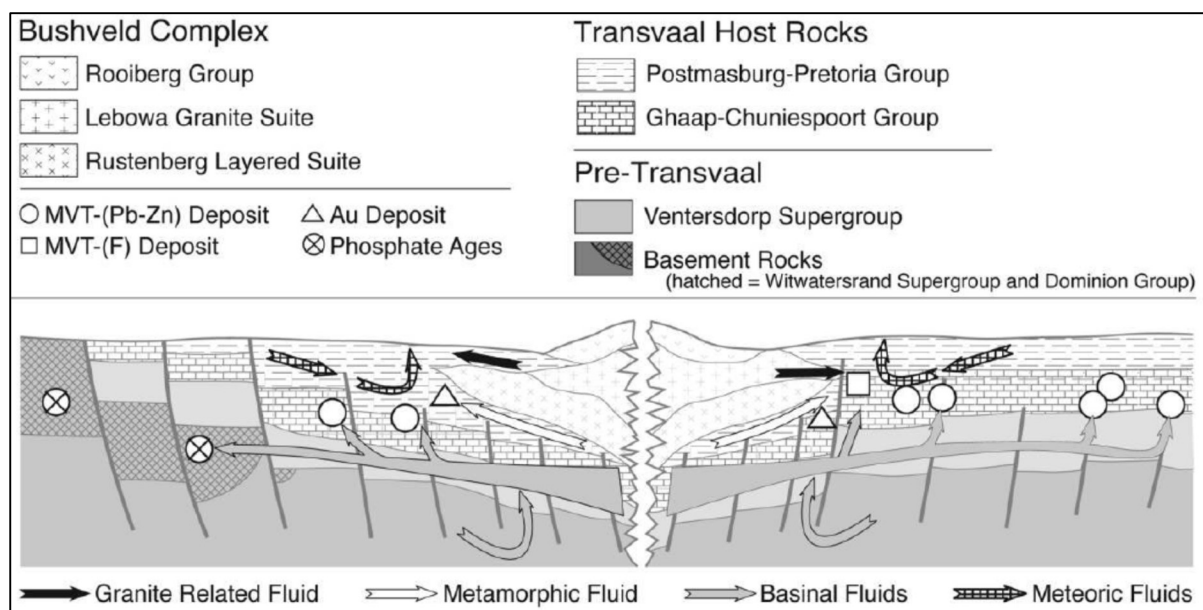
A magmatic source for mineralising fluids is therefore implied, and through mixing with fluids and host rocks of various derivations, distinct mineral deposit-styles formed throughout the Transvaal host rocks (Figure 4).

Under a mineral systems approach, it is critical to identify the source of mineralising fluids, a conduit for transporting the fluids, and a chemical or physical trap that causes deposition of minerals from the fluids.

In the Sabie-Pilgrim's Rest area the source of the mineralising fluids is recognised as the Bushveld Complex. Fluid compositions have a clear magmatic component, consistent with exsolution from the intrusive complex, even though the fluids have been later modified by mixing with crustal and meteoric fluids, and fluid-rock buffering.

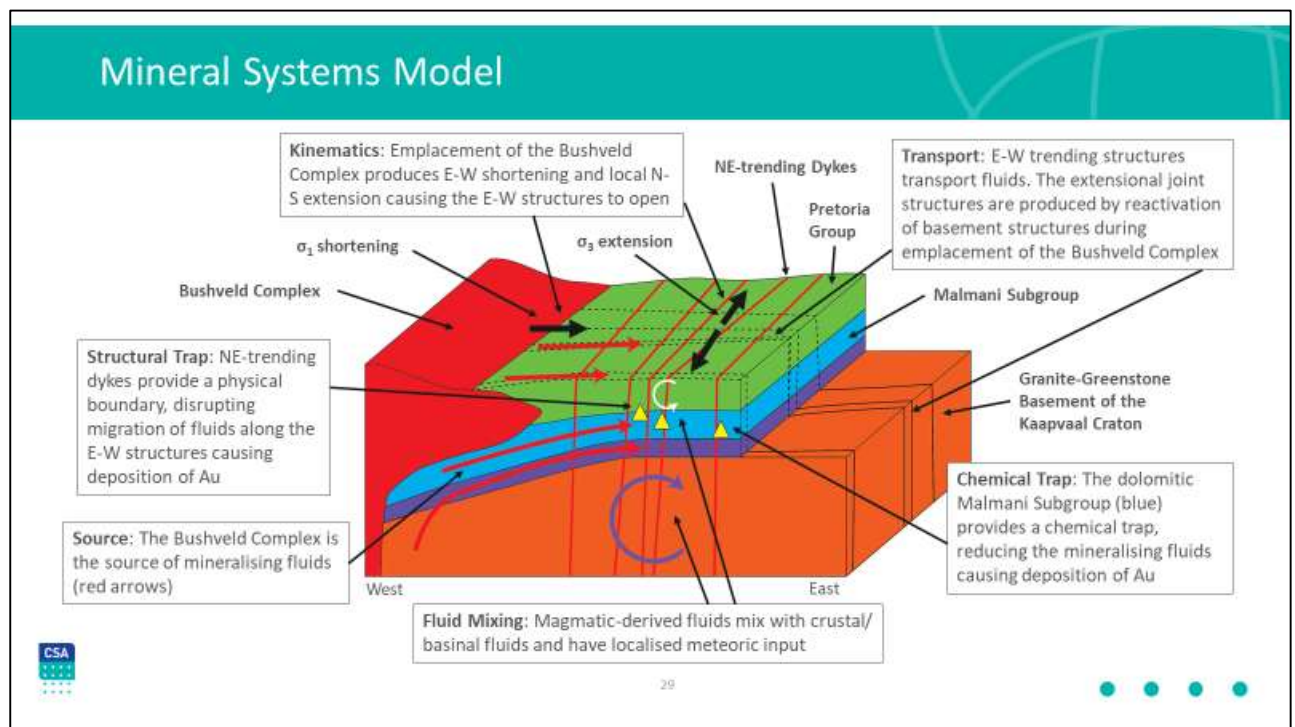
The mineralising fluids are interpreted to be transported away from the Bushveld Complex via east-west orientated structures. Intrusion of the Bushveld Complex induced compression of the surrounding crust; in the Sabie-Pilgrim's Rest area the maximum compressive stress is orientated east-west. This results in east-west shortening of rocks in the Transvaal Basin but also causes reactivation of east-west orientated basement structure in the granite-greenstone rocks of the Kaapvaal Craton. Reactivation of the basement structure combined with north-south extension (orthogonal to compression) resulted in the development of joint sets orientated east-west in the Transvaal Basin; these structures were interpreted from Landsat as part of this work. Such extensional structures are optimally orientated to act as fluid conduits for transport of mineralising fluids from the Bushveld Complex.

Migrating fluids encounter both chemical and physical traps in the Sabie-Pilgrim's Rest area. The dolomitic Malmani Subgroup represents a chemical trap that resulted in reduction and destabilization of the mineralising fluids to cause deposition of gold. This is expressed through replacement-style mineralisation observed by Metz (2015). As fluids were transported eastward, they also interacted with NE-trending structure and dykes in the Sabie-Pilgrim's Rest area. These structures represent a physical or structural trap that may impede the fluid transport or otherwise disrupt transport, resulting in observed mineralisation along NE-trends.

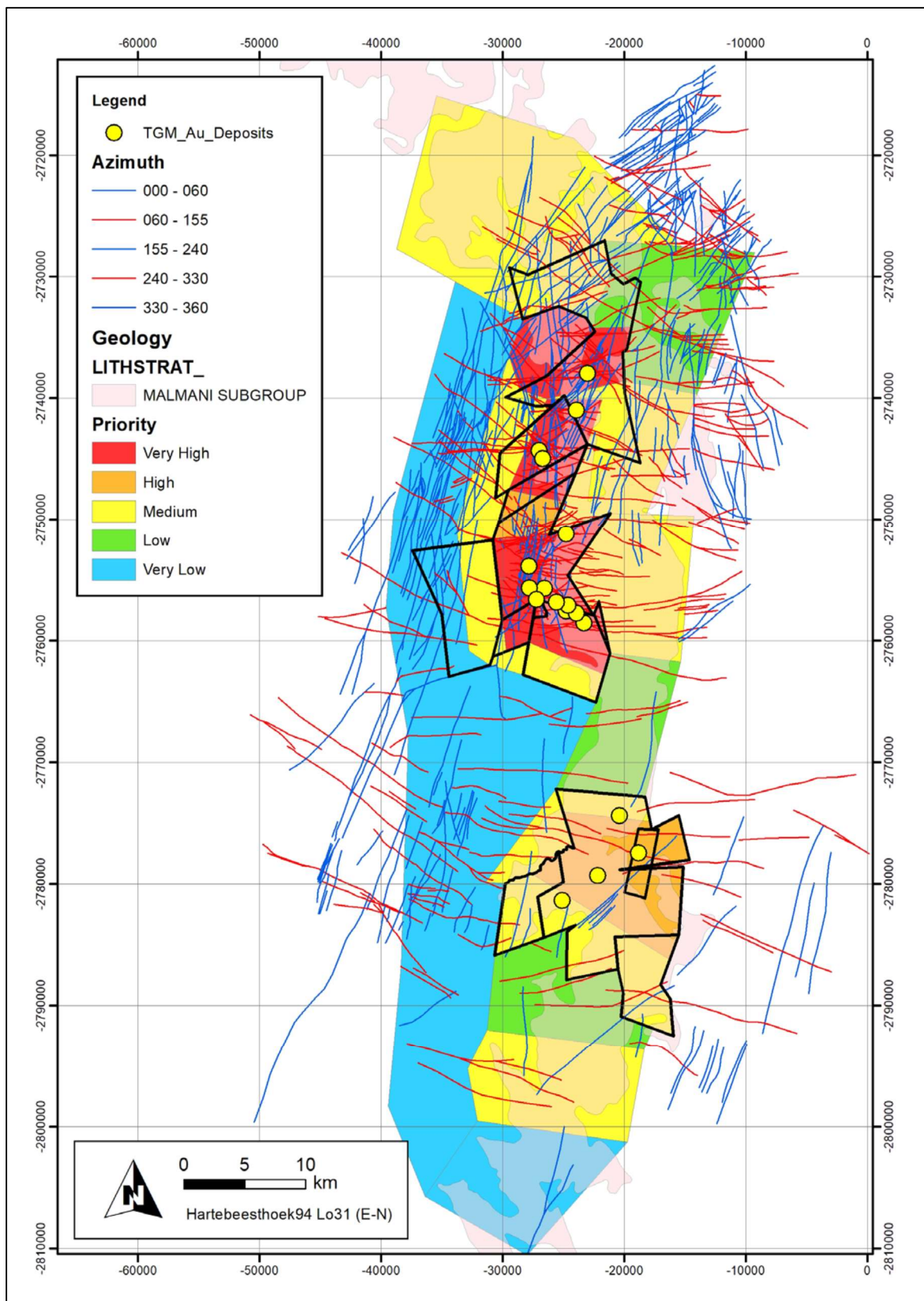


**Figure 4: Mineral systems derived by Gleason et al., 2011**

The 3D mineral systems model shown in Figure 5 demonstrates the key geodynamic processes in the the Sabie & Pilgrim's Rest area.. This mineral system model is being used to generate exploration areas of interest as identified in Figure 6.



**Figure 5: Mineral Systems model developed by CSA Global for Sabie/Pilgrim's Rest Goldfield.**



**Figure 6: Prioritising areas for gold mineralisation based on the Mineral System model**



## References

- Boer, R.H., Meyer, F.M., Robb, L.J., Graney, J.R., Vennemann, T.W., Kesler, S.E., 1995. Mesothermal-type mineralization in the Sabie-Pilgrim's Rest gold field, South Africa. *Economic Geology* 90, 860-876.
- Gleason, J.D., Gutzmer, J., Kesler, S.E., Zwingmann, H., 2011. 2.05-Ga isotopic ages for Transvaal Mississippi Valley-type deposits: Evidence for large-scale hydrothermal circulation around the Bushveld Igneous Complex, South Africa. *The Journal of Geology* 119, 69-80.
- Metz, A.R., 2015. A geochemical study of the Theta Reef of the Frankfort Mining Complex in the Sabie-Pilgrim's Rest Goldfield, South Africa. Unpublished MSc thesis, University of KwaZulu-Natal, Durban.
- Tyler, N., 1986. The origin of gold mineralization in the Pilgrim's Rest goldfield, eastern Transvaal. *Informational Circular, Economic Geology Research Unit, University of Witwatersrand, Johannesburg*, 179, p. 34.

## ABOUT THETA GOLD MINES LIMITED

Theta Gold Mines Limited (ASX: TGM, TGMO) is a gold development company that holds a range of prospective gold assets in a world-renowned South African gold mining region. These assets include several surface and near-surface high-grade gold projects which provide cost advantages relative to other gold producers in the region.

Theta Gold Mines core project is located next to the historical gold mining town of Pilgrim's Rest, in Mpumalanga Province, some 370 km northeast of Johannesburg by road or 95 km north of Nelspruit (Capital City of Mpumalanga Province). Following small scale production from 2011 – 2015, the Company is currently focussing on the construction of a new gold processing plant within its approved footprint at the TGME plant, and for the processing of the Theta Open Pit oxide gold ore. Nearby surface and underground mines and prospects are expected to be further evaluated in the future.

The Company aims to build a solid production platform to over 100 kozpa based primarily around shallow, open-cut or adit-entry hard rock mining sources. Theta Gold Mines has access to over 43 historical mines and prospect areas that can be accessed and explored, with over 6.7 Moz of historical production recorded.

Theta Gold holds 100% issued capital of its South African subsidiary, Stonewall Mining (Pty) Ltd ("Stonewall"). Stonewall holds a 74% shareholding in both Transvaal Gold Mining Estates Limited ("TGME") and Sabie Mines (Pty) Ltd ("Sabie Mines"). The balance of shareholding is held by Black Economic Empowerment ("BEE") entities. The South African Mining Charter requires a minimum of 26% meaningful economic participation by the historically disadvantaged South Africans ("HDSAs"). The BEE shareholding in TGME and Sabie Mines is comprised of a combination of local community trusts, an employee trust and a strategic entrepreneurial partner.



## **DISCLAIMER**

This announcement has been prepared by and issued by Theta Gold Mines Limited (ASX: TGM, TGMO) to assist in informing interested parties about the Company and should not be considered as an offer or invitation to subscribe for or purchase any securities in the Company or as an inducement to make an offer or invitation with respect to those securities. No agreement to subscribe for securities in the Company will be entered into on the basis of this announcement.

This announcement may contain forward looking statements. Whilst Theta Gold Mines has no reason to believe that any such statements and projections are either false, misleading or incorrect, it does not warrant or guarantee such statements. Nothing contained in this announcement constitutes investment, legal, tax or other advice. This overview of Theta Gold Mines does not purport to be all inclusive or to contain all information which its recipients may require in order to make an informed assessment of the Company's prospects. Before making an investment decision, you should consult your professional adviser, and perform your own analysis prior to making any investment decision. To the maximum extent permitted by law, the Company makes no representation and gives no assurance, guarantee or warranty, express or implied, as to, and take no responsibility and assume no liability for, the authenticity, validity, accuracy, suitability or completeness of, or any errors in or omissions, from any information, statement or opinion contained in this announcement. This announcement contains information, ideas and analysis which are proprietary to Theta Gold.

## **FORWARD LOOKING AND CAUTIONARY STATEMENTS**

This announcement may refer to the intention of Theta Gold Mines regarding estimates or future events which could be considered forward looking statements. Forward looking statements are typically preceded by words such as "Forecast", "Planned", "Expected", "Intends", "Potential", "Conceptual", "Believes", "Anticipates", "Predicted", "Estimated" or similar expressions. Forward looking statements, opinions and estimates included in this announcement are based on assumptions and contingencies which are subject to change without notice, and may be influenced by such factors as funding availability, market-related forces (commodity prices, exchange rates, stock market indices and the like) and political or economic events (including government or community issues, global or systemic events). Forward looking statements are provided as a general reflection of the intention of the Company as at the date of release of the document, however are subject to change without notice, and at any time. Future events are subject to risks and uncertainties, and as such results, performance and achievements may in fact differ from those referred to in this announcement. Mining, by its nature, and related activities including mineral exploration, are subject to a large number of variables and risks, many of which cannot be adequately addressed, or be expected to be assessed, in this document. Work contained within or referenced in this report may contain incorrect statements, errors, miscalculations, omissions and other mistakes. For this reason, any conclusions, inferences, judgments, opinions, recommendations or other interpretations either contained in this announcement, or referencing this announcement, cannot be relied upon. There can be no assurance that future results or events will be consistent with any such opinions, forecasts or estimates. The Company believes it has a reasonable basis for making the forward looking statements contained in this document, with respect to any production targets, resource statements or financial estimates, however further work to define Mineral Resources or Reserves, technical studies including feasibilities, and related investigations are required prior to commencement of mining. No liability is accepted for any loss, cost or damage suffered or incurred by the reliance on the sufficiency or completeness of the information, opinions or beliefs contained in this announcement.

The Feasibility Study referred to in this announcement is based on technical and economic assessments to support the estimation of Ore Reserves. There is no assurance that the intended development referred to will proceed as described, and will rely on access to future funding to implement. Theta Gold Mines believes it has reasonable grounds the results of the Feasibility Study.

At this stage there is no guarantee that funding will be available, and investors are to be aware of any potential dilution of existing issued capital. The production targets and forward looking statements referred to are based on information available to the Company at the time of release, and should not be solely relied upon by investors when making investment decisions. Theta Gold cautions that mining and exploration are high risk, and subject to change based on new information or interpretation, commodity prices or foreign exchange rates. Actual results may differ materially from the results or production targets contained in this release. Further evaluation is required prior to a decision to conduct mining being made. The estimated Mineral Resources quoted in this release have been prepared by Competent Persons as required under the JORC Code (2012). Material assumptions and other important information are contained in this release.